Guide to Stories Which Ran In the NEWS In 1959

Editor's Note: Following is a listing of some of the stories and articles which appeared in the NEWS during 1959. This is by no means a complete summary of all articles, but rather some of the more significant stories. They are noted by the headline under which they appeared and are classified by general subject matter.

Copies of some of the issues are still available at 40 cents for a single copy; ten or more copies, 30 cents each; 50 or more copies, 20 cents each. Please see box on page 15 for a listing of available issues.

Air Conditioning and Heating

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Installation & Service Practices In Commercial Refrigeration

One of a group of discussions on several phases of the installation, operation, and servicing of commercial refrigeration equipment.

Line Sizing

By Frank J. Versagi

Repeatedly, the service bulletins of commercial refrigeration manufacturers contain warnings against ignoring their refrigerant line size recommendations, this in itself indicating the tendency of installers to alter line sizes for one reason or another.

One discussion in this group points out that by reducing line sizes, the contractor can make a noticeable reduction in his bid for the job, and usually he has experience behind him to give him confidence that altering the line sizes will not significantly affect performance. Or he may increase line sizes in multiplexing.

But the fact is that, not only map performance suffer, but damage may occur. As one company's service bulletin states the case, "Many failures of the motor-compressor are due to failure of the oil to return to the crankcase. An oversized suction line which reduces gas velocity and slows oil return can be the cause of such a failure—and we find many installations where line sizes are much too large."

Sizing of Refrigerant Lines Becoming Increasingly Critical

The sizing of refrigerant lines, especially suction lines, is becoming increasingly critical with the use of large horsepower machines and because of the quite long tubing runs frequently encountered in larger markets.

"Suction lines that are too small will cause excessive pressure drops and result in a loss of effective capacity at the coils in the fixture. On the other hand, lines that are too large may reduce velocity of the gas to a point where oil return to the compressor is insufficient, warns another service bulletin.

"An oversize liquid line can call for an excessive refrigerant charge with resulting insufficient pumpdown capacity."

Manufacturers' Recommendations Vary

For the installer, the problem is complicated by the fact that the several manufacturers have diverse recommendations relative to line sizing and handling. Thus, one will call for a reduction of one size in a riser if the condensing unit is more than 5 ft. above the fixtures. Others call for a line size reduction only if the rise is more than 10 ft.

Frequently line size recommendations differ for what appear to be identical cases in function and capacity. These variations agree sometimes based on empirical findings of the several manufacturers, sometimes on whether the designer is considering lines sizes in relation to the B.t.u.h. capacity of the fixtures or of the condensing unit serving them.

Such variations as these encourage the experienced installer to base his line sizes in specific instances on his own experience, even if this should disagree with the particular manufacturer's recommendations. As pointed out elsewhere in this group of discussions, this ignoring of manufacturers' specifications, for whatever reason, is a cause of friction between the store operator and the manufacturer who feels he is justified in disclaiming sub-par performance or excessive maintenance attributable directly to such non-compliance.

Basic Reference Points Always Apply

Nevertheless, there are basic reference points which must be considered, and which apply whether or not the installer is following the detailed specifications of the manufacturer.

As indicated earlier, the two major effects of variations in line size are the effects on pressure drop and oil return. The importance of the first effect is accented by repeated reference to it in manufacturer literature. "Bear in mind that a one pound pressure drop in a R-12 system means a decreased in compressor efficiency of 20%; a similar pressure drop in a R-22 system decreases efficiency about 10%," states one manufacturer.

"Using R-12 in low temperature applications, it is vitally necessary that pressure drop in the suction line does not exceed 0.8 p.s.i.," insists another. "For normal temperatures, line sizes must be selected so that a maximum of 1.5 p.s.i. pressure drop is not exceeded for the entire run of tubing from suction service valve to coil connections at the fixture."

Meaning of 'First Fixture' Varies In Mfr. Data

In using the line sizing data furnished by manufacturers, it is well to read carefully the description and reference information given. On multiple hook-ups, for example, manufacturers refer to the "first fixture" in their discussion of line sizing. Where one producer means the case *nearest* the condensing unit, another will mean the fixture *farthest* from the unit by this same term.

Also, care must be given to understanding at what point in the line the manufacturer allows a step up or down in line size. Then, some will allow more than one step-sizing; others recommend only one. Thus, one bulletin insists "Suction lines from the nearest case to the unit should never be increased more than one size after the first 50 ft. of run, regardless of the length of the run."

Discussing this phase of refrigerant piping, another manual states, "There are times when it is advantageous to step-size the tubing—using smaller size close to the fixture and increasing the size as you go back to the condensing unit. Usually, the first 50 ft. of tubing can be of a smaller size than the rest of the run."

This bulletin lists three advantages to step-sizing: 1) the velocity of return gas is increased in the suction line close to the fixture and materially aids in returning oil to the condensing unit; 2) the smaller size tubing close to the cases is easier to handle and may facilitat installation; 3) considerable savings in cost of copper can be accomplished by running the first 50 ft. of tubing in a smaller size.

Arbitrarily Reducing Tubing One Size Could Cause Excessive Drop

All this holds true only when the prescribed amount of pressure drop is maintained over the entire system. Arbitrarily making the tubing one size smaller close to the cases could cause excessive pressure drop.

When two or more cases are connected to a single condensing unit, the connecting line from one case to the next should be graduated in size.

Speaking of its own cases, one manufacturer explains that on low temperature fixtures, the line sizes may be graduated from one case to the next, but in no instance should the suction line be less than ¾-in. As an example, "If three frozen food fixtures were on a single 5-hp. water-cooled unit with a tubing run of 150 ft., a 1⅝-in. line would run to the fixture nearest the condensing unit, then the tubing could be reduced to 1⅛-in. for the second fixture, and further reduced to ¾-in. for the last case.

"On normal temperature applications, it is permissible to reduce down to ⅝-in. suction line for the last case in a multiple hook-up. Example: three produce cases on one 3-hp. air-cooled unit with a 150-ft. run; tubing to the case nearest the unit would be 1⅛-in.; reduced to ⅞-in. for the second, and reduced further to ⅝-in. for the third."

When reducing line sizes for a riser, recommendations normally call for the size reduction to begin with the trap which should preced the riser. The subsequent horizontal run should be expanded to original size on low temperature equipment; on normal temperature cases, this re-expansion is not critical unless the subsequent horizontal run is more than 10 ft.

The sizing of liquid lines is not so critical as the sizing of suction lines. Compared with maximum allowable pressure drops of 1 p.s.i. or less for suction lines, pressure drops approaching 5 p.s.i. can be tolerated in liquid refrigerant lines, and one service bulletin mentions that liquid line sizes indicated for cases need not be increased for distances up to 250 ft.

Tech Center

Tech Center by Frank J. Versagi has been omitted from this issue to permit publication of the annual index of news stories. The series, which is currently discussing "Applied Electrical Theory," will resume in the next issue.

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